FURUNO®

Installation Manual
MARINE RADAR MODEL 851 MARK-2

SAFETY INSTRUCTIONS i

SYSTEM CONFIGURATION iii

EQUIPMENT LISTS iv

1. MOUNTING 1-1
1.1 Mounting Methods for Antenna Unit 1-1
1.2 Fixing Holes in Mounting Platform 1-2
1.3 Fastening the Radiator to the Radiator Bracket 1-2
1.4 Mounting the Antenna Unit 1-3
1.5 Connecting the Signal Cable 1-7
1.6 Mounting Methods for Display Unit 1-10
1.7 Mounting the Display Unit 1-11

2. WIRING 2-1
2.1 Connections 2-1
2.2 Input/Output Data List 2-3
2.3 Attaching OPTION Connector 2-4
2.4 Connection of two NMEA equipments 2-6
2.5 Installation Check List 2-7

3. ADJUSTMENTS 3-1
3.1 Checking magnetron heater voltage 3-1
3.2 Initial Adjustment of Picture 3-2
3.3 Displaying the Installation Menus 3-3
3.4 Entering Initial Settings 3-4
3.5 Heading Alignment 3-5
3.6 Sweep Timing 3-6

PACKING LIST A-1

OUTLINE DRAWINGS D-1

INTERCONNECTION DIAGRAM S-1

SCHEMATIC DIAGRAMS S-2

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⚠ SAFETY INSTRUCTIONS

⚠ WARNING

Radio Frequency Radiation Hazard

The radar antenna emits electromagnetic radio frequency (RF) energy which can be harmful, particularly to your eyes. Never look directly into the antenna aperture from a close distance while the radar is in operation or expose yourself to the transmitting antenna at a close distance.

Distances at which RF radiation levels of 100 and 10 W/m^2 exist are given in the table below.

Note: If the antenna unit is installed at a close distance in front of the wheel house, your administration may require halt of transmission within a certain sector of antenna revolution. This is possible — Ask your FURUNO representative or dealer to provide this feature.

Type	Radiator type	Distance to 100 W/m^2 point	Distance to 10 W/m^2 point
MODEL 851 MARK-2	XN10A	0.2 m	Worst case 3.0 m

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Do not open the equipment unless totally familiar with electrical circuits and service manual.

Only qualified personnel should work inside the equipment.

Wear a safety belt and hard hat when working on the antenna unit.

Serious injury or death can result if someone falls from the radar antenna mast.

Construct a suitable service platform from which to install the antenna unit.

Serious injury or death can result if someone falls from the radar antenna mast.

Turn off the power at the mains switchboard before beginning the installation.

Fire, electrical shock or serious injury can result if the power is left on or is applied while the equipment is being installed.

Turn off the radar power switch before servicing the antenna unit. Post a warning sign near the switch indicating it should not be turned on while the antenna unit is being serviced.

Prevent the potential risk of someone begin struck by the rotating antenna and exposure to RF radiation hazard.

⚠ WARNING

Be sure that the power supply is compatible with the voltage rating of the equipment.

Connection of an incorrect power supply can cause fire or equipment damage. The voltage rating of the equipment appears on the label above the power connector.

Use only the specified power cable.

Fire or equipment damage can result if a different cable is used.

⚠ CAUTION

Ground the equipment to prevent electrical shock and mutual interference.

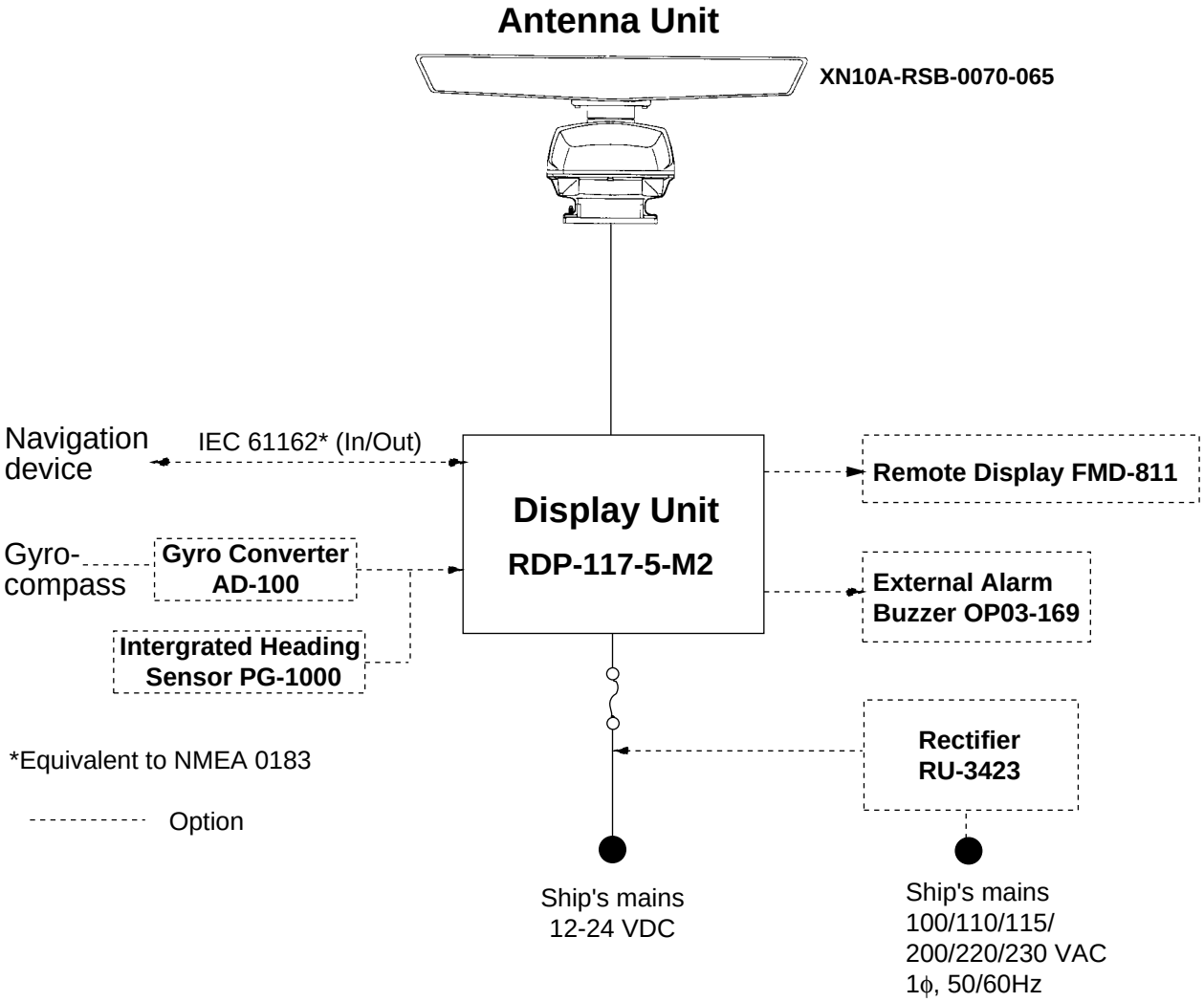
Observe the following compass safe distances to prevent deviation of a magnetic compass:

	Standard compass	Steering compas
Display unit	0.70 m	0.50 m
Antenna unit	1.00 m	0.75 m

Use the proper fuse.

Use of a wrong fuse can result in fire or permanent equipment damage.

SYSTEM CONFIGURATION



EQUIPMENT LISTS

Standard Supply

Name	Type	Code No.	Qty	Remarks
Antenna Unit	XN10A-RSB-0070-065	—	1	
Display Unit	RDP-117-5-M2	—	1	
Installation Materials	CP03-21500	000-087-747	Select one	CP03-18401, power cable, 10 m signal cable
	CP03-21510	000-087-748		CP03-18401, power cable, 15 m signal cable
	CP03-21520	000-087-749		CP03-18401, power cable, 20 m signal cable
	CP03-21530	000-087-750		CP03-18401, power cable, 30 m signal cable
	CP03-21540	000-086-548		CP03-18401, power cable, w/o signal cable
Accessories	FP03-05900	008-462-050	1 set	
Spare Parts	SP03-12100	000-086-964	1 set	

Optional Supply

Name	Type	Code No.	Qty	Remarks
External Buzzer	OP03-169		1	
Rectifier	RU-3423	—	1	
Cable Assy.	FM-C6FPS001-050	000-142-031	1	For AD-100/NAV, 5 m w/6P connector at one side
	FM-C6FPS001-100	000-142-030	1	For AD-100/NAV, 10 m w/6P connector at one side
	FM-C6FPD001-050	000-143-897	1	For PG-1000/NAV, 5 m w/6P connector at both ends, Straight
	FM-C6FPD001-100	000-143-898	1	For PG-1000/NAV, 10 m w/6P connector at both ends, Straight
	FM-C6FPD002-050	000-143-895	1	For NAV, 5 m w/6P connector at both ends, Cross
	FM-C6FPD002-100	000-143-896	1	For NAV, 10 m w/6P connector at both ends, Cross
Cable set	OP03-170-5	008-466-600	1	For E/S/ NAV, 5m w/6P connector at one side, OP03-172
	OP03-170-10	008-466-610	1	For E/S/ NAV, 10m w/6P connector at one side, OP03-172
	OP03-171-5	008-466-620	1	For E/S/ NAV, 5m w/6P connector at both ends, OP03-172
	OP03-171-10	008-466-630	1	For E/S/ NAV, 10m w/6P connector at both ends, OP03-172
Remote Display	FMD-811	—	1	LCD type

1. MOUNTING

1.1 Mounting Methods for Antenna Unit

- The antenna unit is generally installed either on top of the wheelhouse or on the radar mast on a suitable platform. Locate the antenna unit where there is a good all-round view. Any obstruction will cause shadow and blind sectors. A mast for instance, with a diameter considerably less than the width of the radiator, will cause only a small blind sector, but a horizontal spreader or crosstrees in the same horizontal plane as the antenna unit would be a much more serious obstruction; you would need to place the antenna unit well above or below it.
- It is rarely possible to place the antenna unit where a completely clear view in all directions is available. Thus, you should determine the angular width and relative bearing of any shadow sectors for their influence on the radar at the first opportunity after fitting.
- If you have a radio direction finder on your boat, locate its antenna clear of the antenna unit to prevent interference to the direction finder. A separation of more than two meters is recommended.
- To lessen the chance of picking up electrical interference, avoid where possible routing the signal cable near other onboard electrical equipment. Also avoid running the cable in parallel with power cables.
- A magnetic compass will be affected if placed too close to the antenna unit. Observe the following compass safe distances to prevent deviation of a magnetic compass: Standard compass, 1.00 m, Steering compass, 0.75 m.
- Do not paint the radiator aperture, to ensure proper emission of the radar waves.
- When this radar is to be installed on larger vessels, consider the following points:
  - The signal cable run between the antenna and the display comes in lengths of 10 m (standard), 15 m, 20 m and 30 m. Whatever length is used it must be unbroken; namely, no splicing allowed.
  - Deposits and fumes from a funnel or other exhaust vent can adversely affect the aerial performance and hot gases may distort the radiator portion. The antenna unit must not be mounted where the temperature is more than 70°C.

As shown in the figure below, the antenna unit may be installed on the bridge, on a common mast or on the radar mast.

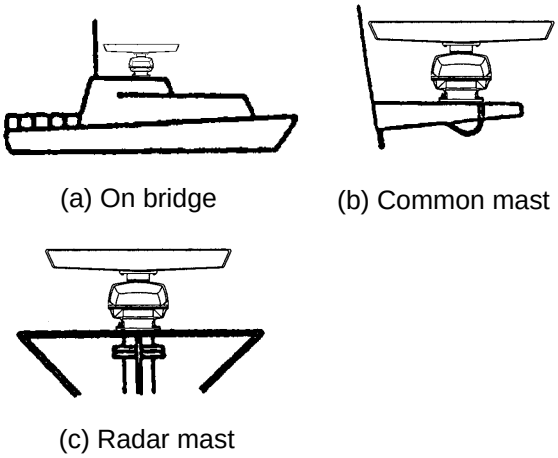


Figure 1-1 Antenna unit mounting methods

1.2 Fixing Holes in Mounting Platform

Referring to the outline drawing on page D-1, drill five holes in the mounting platform: four holes of 15 mm diameter for fixing the antenna unit and one hole of 25-30 mm diameter for the signal cable.

1.3 Fastening the Radiator to the Radiator Bracket

There are installation materials for the Radiator not shown in the packing list. These are as shown below.

Name	Qty	Remarks
O-ring	1	NBR
Hex. head bolt	4	M8 x 30
Flat washer	4	M8
Spring washer	4	M8
Silicone sealant	1	#1211, 50g

1. Remove the radiator cap from the radiator bracket.
2. Coat contacting surface between antenna radiator and radiator bracket with silicone sealant as shown in Figure 1-2.

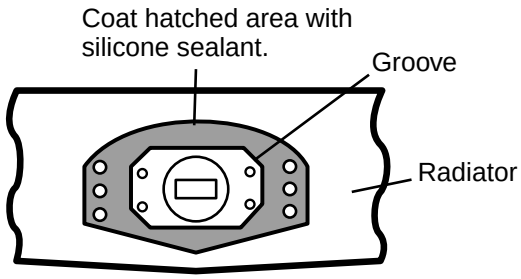


Figure 1-2 Coating the bottom of antenna radiator for XN10A with silicone sealant

3. Coat threaded holes on the antenna radiator with silicone sealant.
4. Grease the O-ring and set it to the radiator bracket.
5. Lay the antenna radiator on the radiator bracket.
6. Coat the radiator fixing bolts (4 pcs.) with silicone sealant. Fasten the antenna radiator to the radiator bracket with the radiator fixing bolts, flat washers and spring washers.

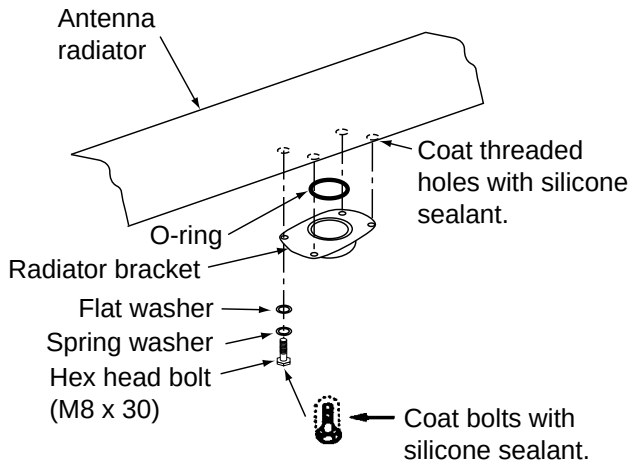


Figure 1-3 Fastening the radiator bracket to the antenna unit chassis

1.4 Mounting the Antenna Unit

The antenna unit can be mounted using the fixing holes on the outside (200 x 200 mm) or inside (140 x 150 mm) the antenna unit.

Outside fixing holes

Use the hex head bolt (supplied) to mount the antenna unit as below.

1. Lay the corrosion-proof rubber mat (supplied) on the mounting platform.

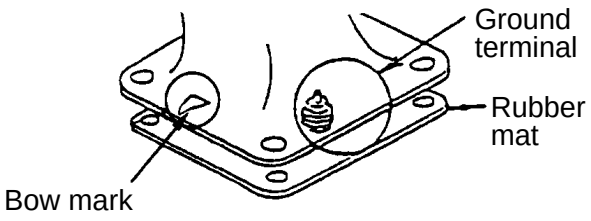


Figure 1-4 Location of rubber mat

2. Lay the antenna unit on the mounting platform, orienting it as shown in Figure 1-5.

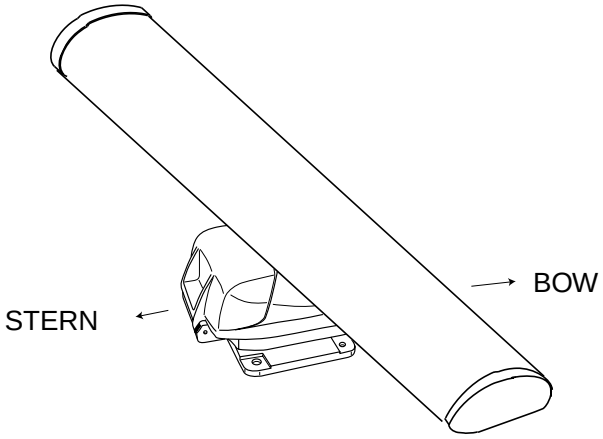


Figure 1-5 Antenna unit

⚠ CAUTION

Do not lift the antenna unit by the radiator; lift it by the housing.

The radiator may be damaged.

3. Insert four hex bolts and seal washers from the top of the antenna housing. Insert the seal washers with the larger diameter next to the bolt heads. Be sure the seal washer, not other washers, is next to bolt head.

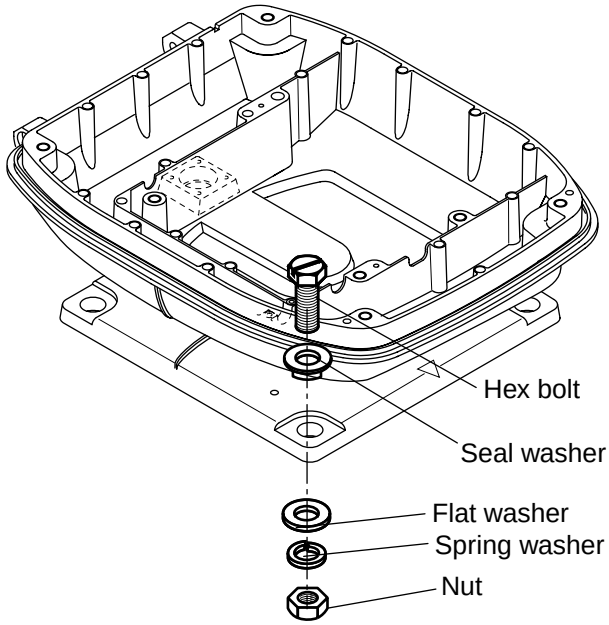


Figure 1-6 Fixing the antenna unit chassis

4. Pass flat washers, spring washers and nuts onto hex bolts. Fasten by tightening nuts. Do not fasten by tightening the hex bolts; seal washers may be damaged.

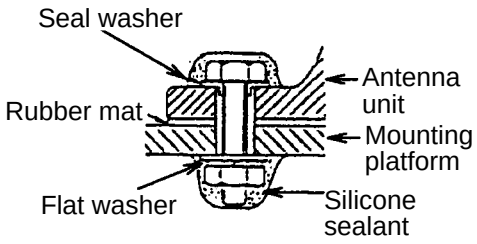


Figure 1-7 How to fasten antenna unit to mounting platform

5. Coat flat washers, spring washers, nuts and exposed parts of bolts with silicone sealant.
6. Prepare ground point in mounting platform (within 300 mm of ground terminal on antenna unit) using M6 x 25 bolt, nut and flat washer.
7. Run the ground wire (RW-4747, 340 mm) between the ground terminal and ground point.
8. Coat ground terminal and ground point with silicone sealant as shown in Figure 1-8.

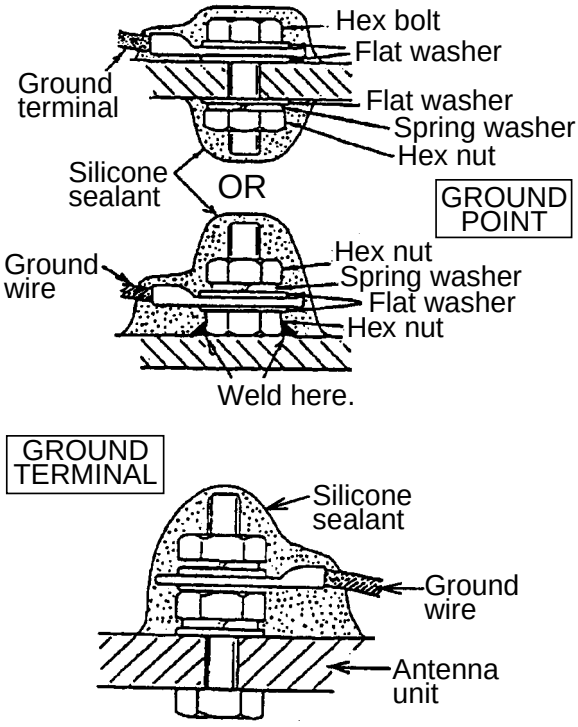


Figure 1-8 How to coat ground point and ground terminal with silicone sealant

Fixing holes inside antenna unit

This method requires removal of the RF unit in the antenna unit to access inside fixing holes. Use hex head bolts, flat washers, spring washers and nuts (local supply) to mount the antenna unit, confirming length of bolts.

1. Loose four hex. bolts to open the antenna unit. Refer to Figure 1-10 for location.

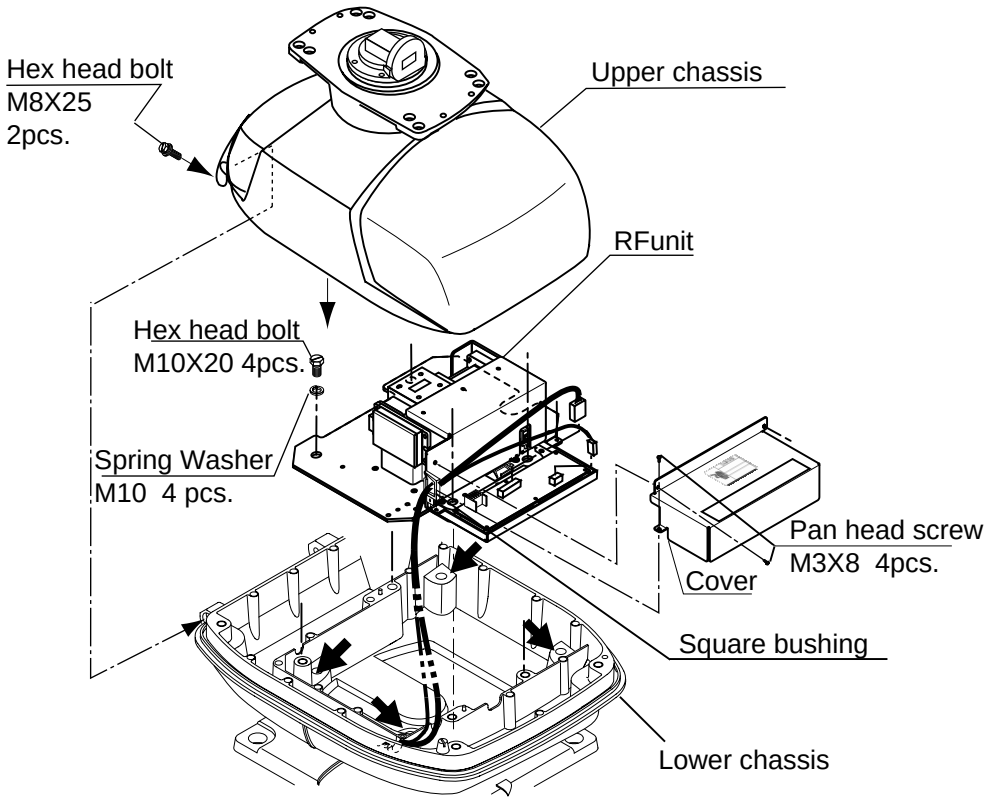


Figure 1-9 Antenna unit chassis, upper chassis separated

2. Unplug connector connected between upper and lower chassis.
3. Separate upper chassis from lower chassis by removing two hex head bolts.
4. Remove cover by unfastening four pan head screws.
5. Remove connector from RF unit.
6. Remove RF unit by unfastening four hex head bolts.
7. Lay the corrosion-proof rubber mat (supplied) on the mounting platform.
8. Fasten the lower chassis to the mounting platform with hex head bolts, spring washers, flat washers and nuts (local supply), and then coat flat washers, nuts and exposed parts of bolts with silicone sealant. Cut a slit in rubber bushing and insert bolt into bushing. Do not use seal washers.
9. Reassemble RF unit, cover and upper chassis.
10. Set four caps (supplied) into outside fixing holes.
11. Do steps 6-8 in “Outside fixing holes”.

1.5 Connecting the Signal Cable

Only one signal cable runs from the display unit to the antenna unit. In order to minimize the chance of picking up electrical interference, avoid where possible routing the signal cable near other onboard electrical equipment. Also, avoid running the cable in parallel with power cables. Pass the cable through the hole and apply sealing compound around the hole for waterproofing.

1. Open the antenna cover by loosening four hex. bolts, and then fix the stay.

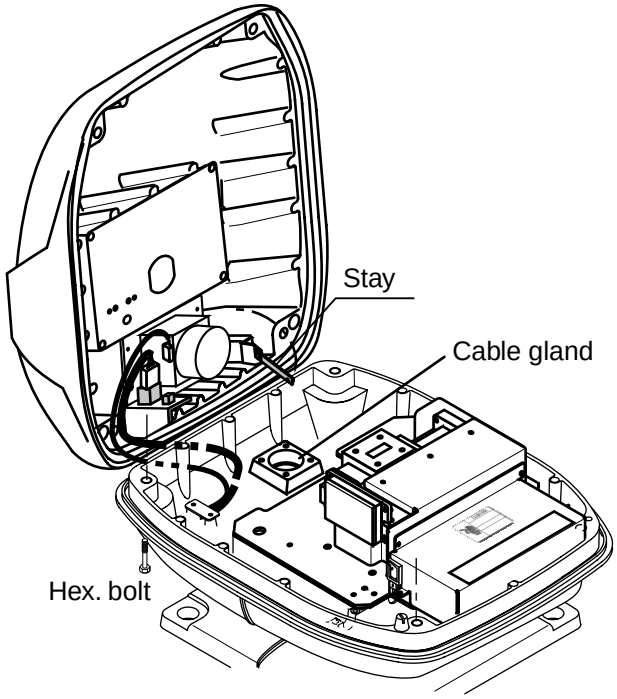


Figure 1-10 Antenna unit chassis, cover opened

2. Unfasten the cable gland assembly (plate, gasket, flat washer).
3. Pass the signal cable w/connector through the bottom of the antenna unit chassis. Pass the cable through the gland assembly as shown below.

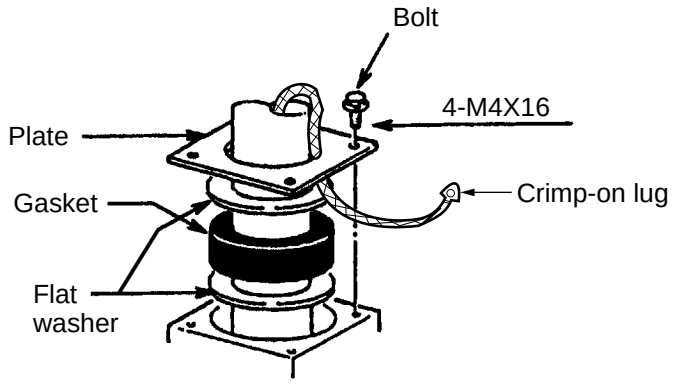


Figure 1-11 Passing the signal cable through the cable gland assembly

4. Fasten the crimp-on lug on the shield to one of the fixing bolts of the cable gland assembly.

5. Position the signal cable so that no more than 4 cm of the sheath is exposed as shown in the figure below. Tighten fixing bolts.

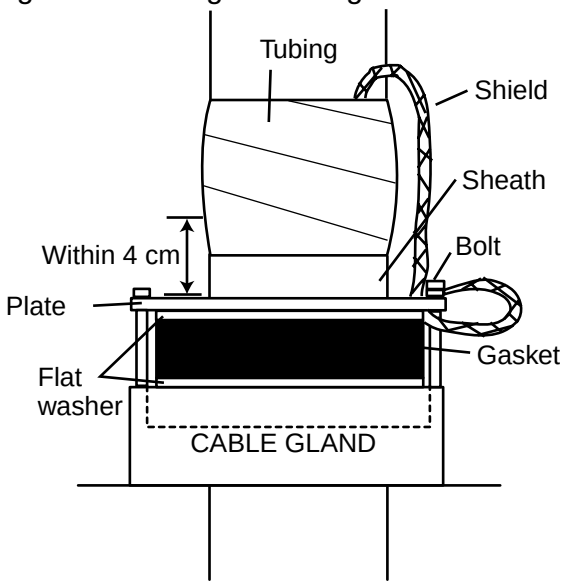


Figure 1-12 How to fix signal cable in cable gland

6. Unfasten four screws shown in the figure below.

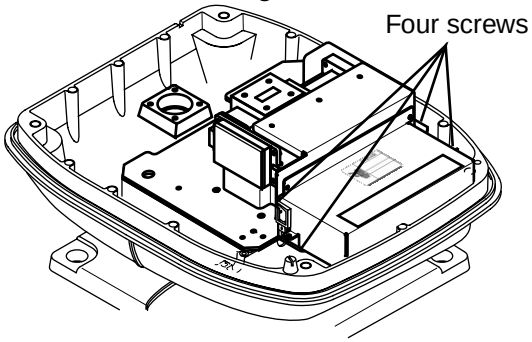


Figure 1-13 Antenna unit chassis, cover opened

7. Pass the signal cable through the cable protector.

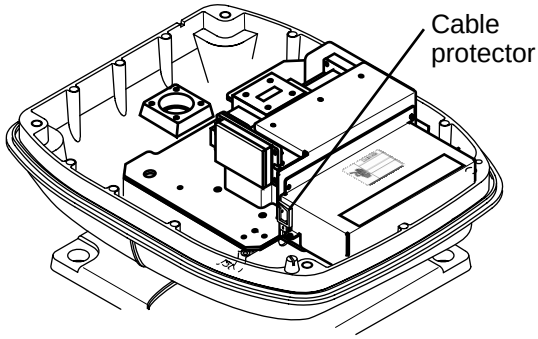


Figure 1-14 Antenna unit chassis, cover opened

8. Connect the signal cable to the RTB Board (03P9249), referring to the interconnection diagram and the figure below.

9. Attach three EMI cores to the signal cable as shown below.

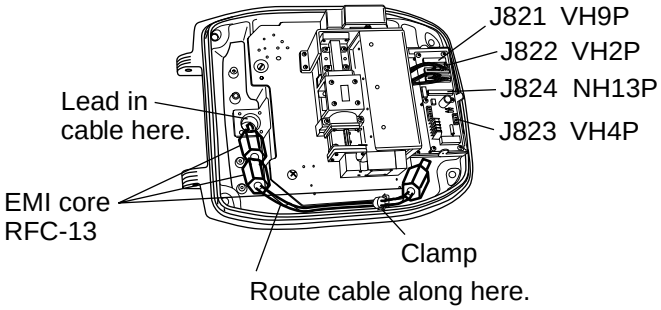
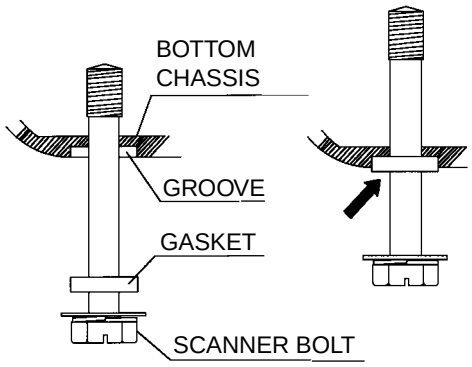


Figure 1-15 Antenna unit chassis, cover opened

10. Fix the signal cable with the cable clamp.
11. Release the stay and close the cover. Loosely fasten the cover fixing screws; you will have to make some adjustments inside after completion of wiring.

Note: When closing the cover, set the gaskets to grooves in the bottom chassis, then tighten bolts.



Torque :9.8 ± 0.1 N • m

Figure 1-16

1.6 Mounting Methods for Display Unit

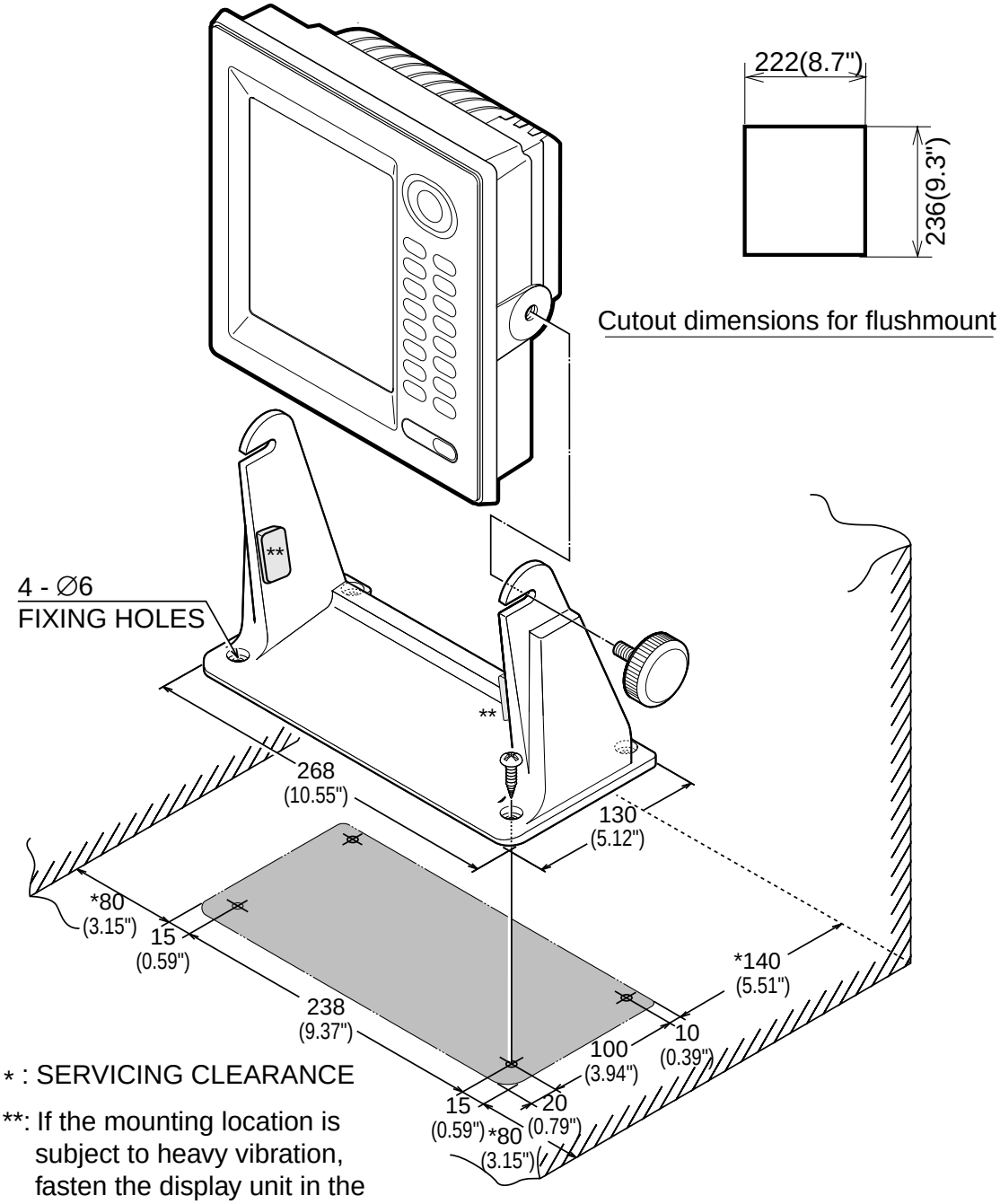
When selecting a mounting location for the display unit keep in mind the following points.

- The display unit is designed and constructed to be splashproof, thus it can be installed outdoors. You can even hose it down after a day's outing. If it is to be installed outdoors, we recommend installing it an enclosed cabinet, for maximum protection against the marine environment.
- The temperature and humidity of the mounting location should be stable and moderate. No LCD can provide adequate contrast if the ambient temperature is too extreme.
- The display unit consumes only a moderate amount of power, so there is no need for forced air ventilation. However, you should provide adequate space behind and around the unit to permit circulation of air and to provide convenient access to the rear connectors.
- Even though the picture is quite legible even in bright sunlight, keep the display unit out of direct sunlight or at least shaded because of heat that can build up inside the cabinet.
- Locate the display unit in a position where you can view and operate it conveniently but where there is no danger of salt or fresh water spray or immersion.
- The orientation of the display unit should be so the radar screen is viewed while the operator is facing in the direction of the bow. This makes determination of your position much easier.
- Make sure you allow enough clearance both to get to the connectors behind the unit and to allow you to get your hands in on both sides to loosen or tighten the mounting knobs. Make sure you leave at least a foot or so of "service loop" of cables behind the unit so it can be pulled forward for servicing or easy removal of the connectors.
- A magnetic compass will be affected if placed too close to the display unit. Observe the minimum compass safe distances to prevent deviation of a magnetic compass: standard compass, 0.7 meters, and steering compass, 0.5 meters.

1.7 Mounting the Display Unit

The display unit is designed to be mounted on a tabletop.

1. Using the hanger as a template, mark screw locations in the mounting location.
2. Fix the hanger to the mounting location with four 5 x 20 tapping screws (supplied).
3. Fit the knob bolts to the display unit.
4. Install the knob bolts in the hanger.
5. Tighten the knob bolts securely.



* : SERVICING CLEARANCE

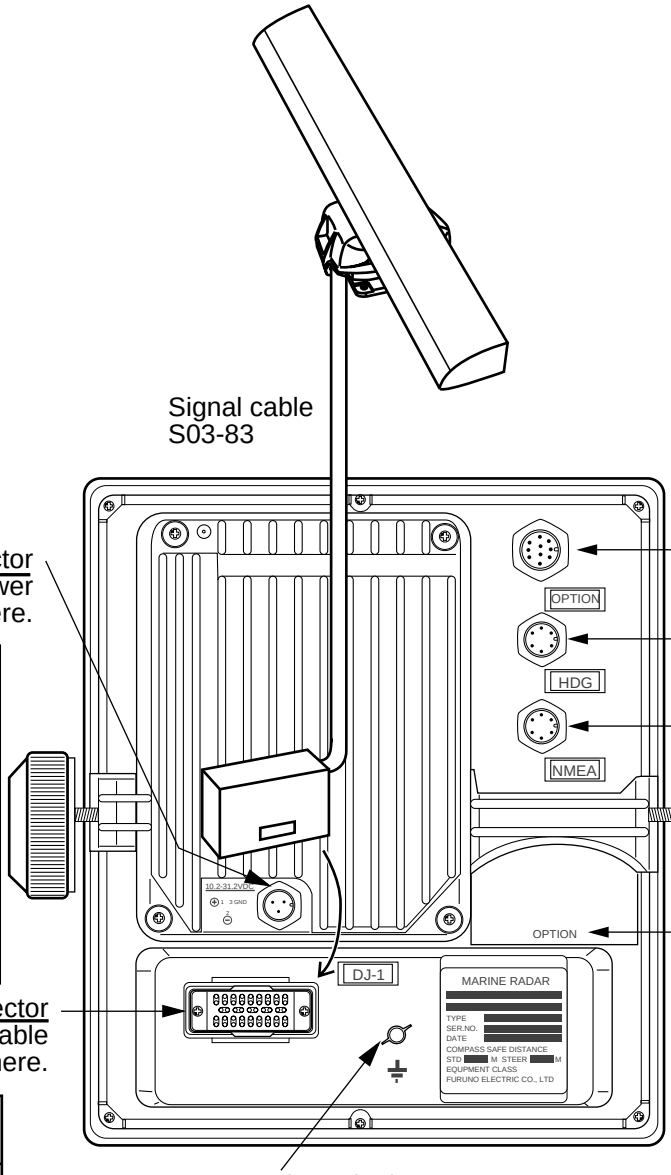
**: If the mounting location is subject to heavy vibration, fasten the display unit in the hanger perpendicularly so that it contacts the rubber cushions.

Figure 1-17 How to mount the display unit

2. WIRING

2.1 Connections

Connect the signal and power cables, the ground wire and optional equipment as shown in Figure 2-1.



Power cable connector
Connect power cable here.

CAUTION

For 24 volt power, replace fuse with 5A fuse (supplied), and attach "5A fuse label" to the fuse cover on power cable.
Factory setting is 10A for 12 VDC set.

Signal cable connector
Connect signal cable from antenna here.

CAUTION

Tighten the boot-band securely to ensure watertightness.

See next page.

OPTION connector *1
Connect remote display here.

HDG connector *2
Connect heading sensor here.

NMEA connector *3
Connect navaid here.

OPTION connector
Connect navaid, echo sounder or external buzzer here.

Ground terminal
Connect ground wire between here and ship's ground.

Figure 2-1 Display unit, rear view

*1:The following cables are supplied with remote display.

Type	Code no.	Remarks
FM-C10FPD002-050	000-143-894	5m
FM-C10FPD002-100	000-143-893	10m
FM-C10FPD002-150	000-143-892	15m

FM-C10FPD002-200	000-143-891	20m
FM-C10FPD002-300	000-143-890	30m

*2:The following cables are optionally supplied for heading sensor connection.

Type	Code no.	Remarks
FM-C6FPD001-050	000-143-897	PG-1000 (5m)
FM-C6FPD001-100	000-143-898	PG-1000 (10m)

*3:The following cables can be used for NMEA 0183 format connection.

Type	Code no.	Remarks
FM-C6FPD002-050	000-143-895	6P-6P(5m), Cross type
FM-C6FPD002-100	000-143-896	6P-6P(10m) , Cross type

Signal cable connection

1. Connect the signal cable to DJ-1 on the rear panel of the display unit.

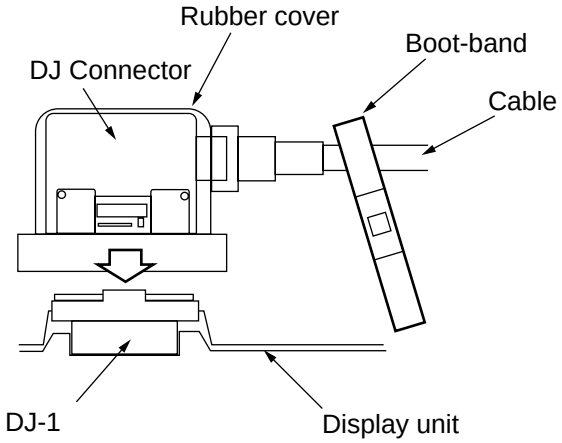


Figure 2-2

2. Cover the connector with the rubber cover. The projection on the connector base is inserted into the groove on the rubber cover.

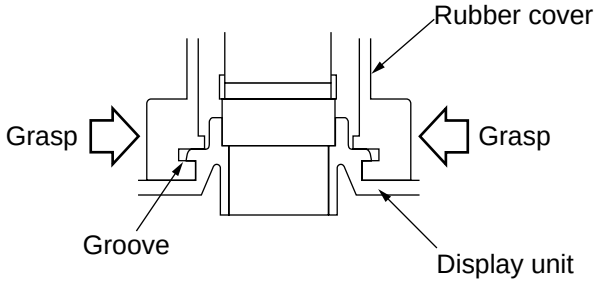


Figure 2-3

3. Put the boot-band as shown below, and tighten it.

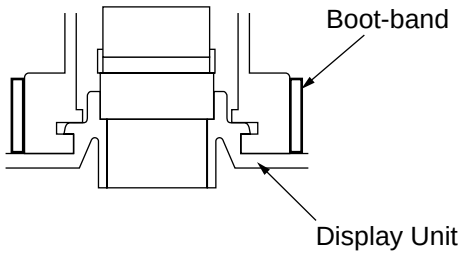


Figure 2-4

2.2 Input/Output Data List

This radar can receive the following NMEA 0183 format data sentences from a navigator or echosounder. Your vessel's position in latitude and longitude, the range and bearing to waypoint, speed, course, and depth may be seen on the display.

Input

GLL:	Geographic position – Lat/Long
BWR:	Bearing and Distance to Waypoint – Rhumb line
BWC:	Bearing and Distance to Waypoint – Great circle
GLC:	Geographic position – Loran-C
GTD:	Geographic position – Time Difference
RMA:	Recommended Minimum Specific Loran-C Data
RMB:	Recommended Minimum Navigation Information
RMC:	Recommended Minimum Specific GPS/Transit Data
VTG:	Track Made Good and Ground Speed
MTW:	Water Temperature
DBT:	Depth Below Transducer (Ver 1.5)
DBS:	Depth Below Surface
DPT:	Depth (Ver 2.0)
GGA:	GPS – Rx status, L/L
VBW:	Dual ground/water speed
DBK:	Depth
HDM:	Heading Magnet
HDG:	Heading Deviation and Variation
HDT:	Heading True

Output

TLL:	Target Position
RSD:	Radar System Data

2.3 Attaching OPTION Connector

You can connect external buzzer or NMEA equipment (Echosounder and/or Video plotter) by attaching the optional connector kit.
This radar can output NAV data received from a navaid to a video plotter.
For how to distribute NAV data, refer to “2.4 Connection of two equipments”.

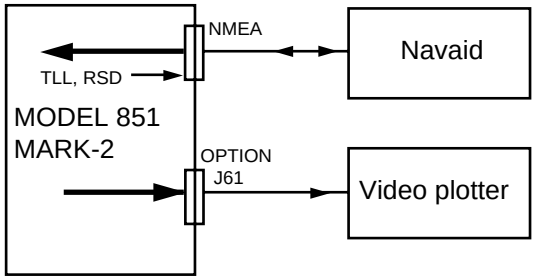


Figure 2-5

1. Remove the plastic cover of OPTION from rear cover.
2. Disconnect all connectors from rear panel.
3. Dismount the display unit from hanger.
4. Unfasten eight screws and three nuts fixing the waterproof connector to remove the rear covers.

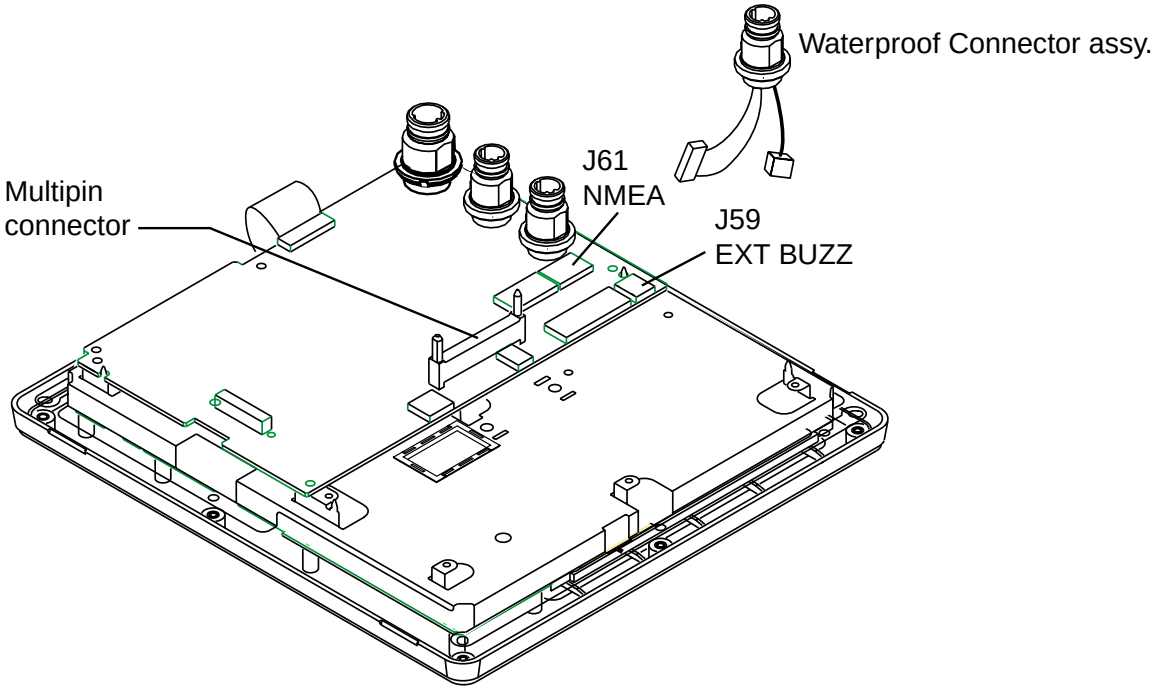
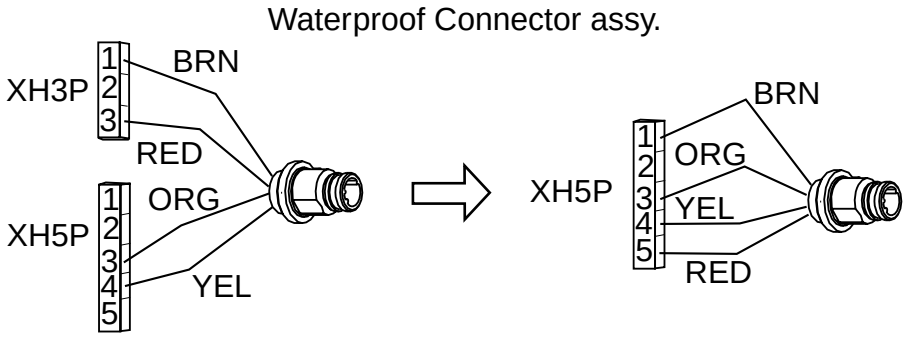


Figure 2-6 Display unit rear view

5. Connect connector assy. to J61(NMEA)/J59(EXT BUZZ) on SPU Board (SPU-9180).
   To distribute NAV data, modify waterproof connector assy. as shown figure 2-7.



1. Remove #1 and #3 contacts from the XH3P.
2. Discard XH3P connector.
3. Insert brown and red wires (contacts) into the XH5P as shown above.
4. Connect XH5P connector to J61 on SPU Board.

Figure 2-7

6. Pass waterproof connector through the hole named OPTION on rear cover.
7. Reassemble the display unit.

CAUTION

When reassembling the display unit, be sure the rear cover is fitted to the front chassis properly when closing the rear cover. Press the center of the rear cover to plug in the multipin connector on the rear cover.

8. Tighten the nut of the connector (Torque: 7.6±0.02N·m).
9. Mount the display unit in the hanger.
10. Connect all connectors on rear panel.

2.4 Connection of two NMEA equipments

You can connect a video plotter and echosounder to the 6P OPTION connector.

1. Wire OP03-170-5/OP03-170-10 as shown in Figure 2-8.
2. Pass steel mesh through the cable.
3. Solder cable.

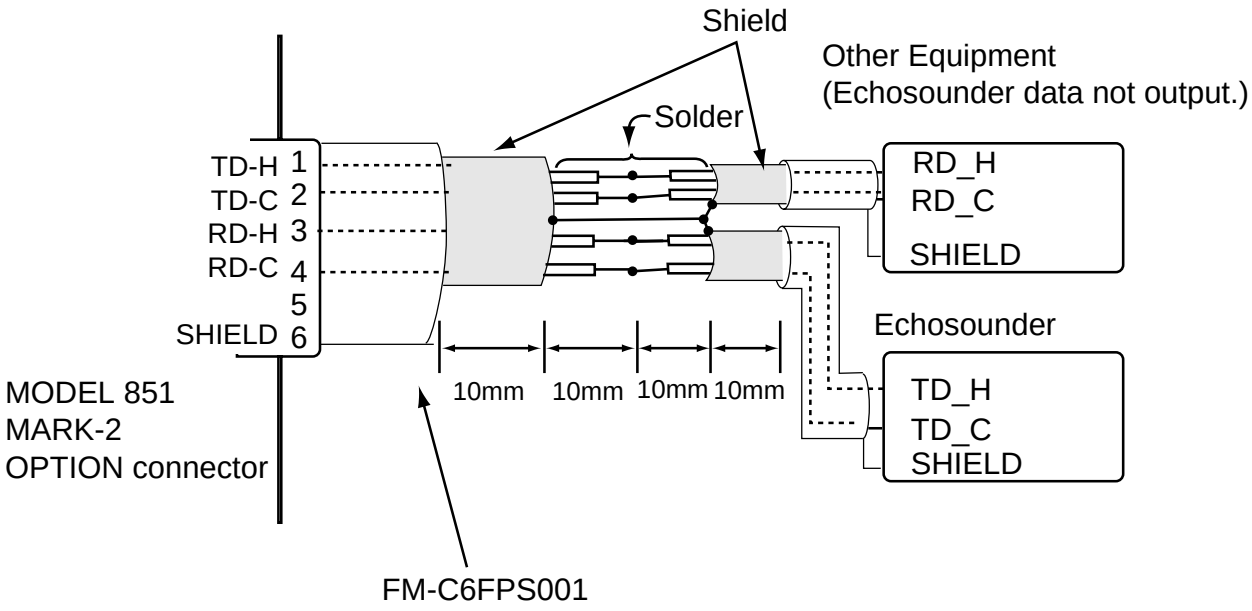


Figure 2-8

4. Cover shield with steel mesh by cable ties.

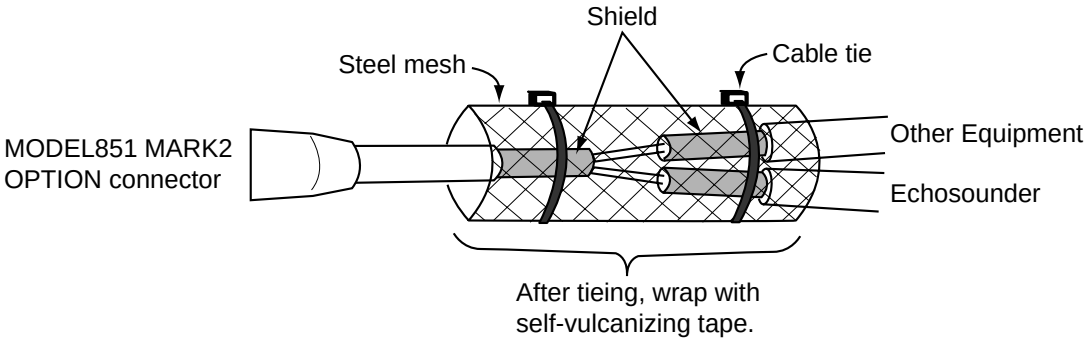


Figure 2-9

5. Wrap with self-vulcanizing tape.

2.5 Installation Check List

After completing the installation it is a good idea to check for proper installation. Follow the checklist below and tick boxes to show proper completion.

- ❒ Is the signal cable secured against a mast or bulkhead?
- ❒ Is the cable gland or cable entry on the deck fully waterproofed?
- ❒ Are the connections to the battery correct polarity?
- ❒ Are all the antenna and display units grounded?
- ❒ Are all connectors at the rear of the display unit fastened securely?

3. ADJUSTMENT

3.1 Checking magnetron heater voltage

Magnetron heater voltage is formed on the MD Board (03P9235) of the antenna unit, and is preadjusted at the factory for use with any length of signal cable. Therefore no adjustment is required. However, check magnetron heater voltage as follows:

1. Turn on the radar and leave it in stand-by.
2. Open the antenna cover.
3. Unfasten four screws to remove the RF section cover.

⚠ DANGER

ELECTRICAL SHOCK HAZARD

This check is done with the power on — DO NOT touch the magnetron.

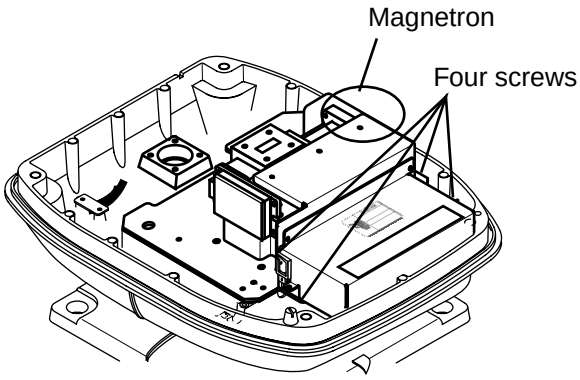


Figure 3-1 Antenna unit, cover opened

4. Connect a multimeter, set to 10 VDC range, between test point J825#4 and J825#6 (GND) on the RTB Board (03P9249).

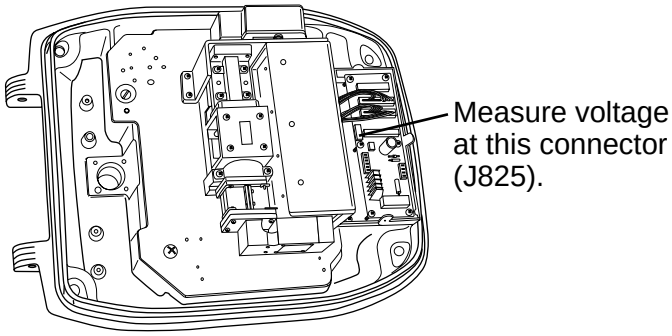


Figure 3-2 Antenna unit, cover opened

5. Confirm the meter reads 7.6 V ±0.1 V.
6. Close the antenna cover and tighten the cover fixing screws.

3.2 Initial Adjustment of Picture

Follow the procedure below to obtain proper radar picture.

1. Press the [POWER] key on the display unit. The display should light. Wait until the message "ST-BY" appears on the screen. (About one and half minutes.)
2. Press [ST-BY/TX] key to transmit. The radar will start transmitting, and you will probably see some targets around you, even though the radar is not yet properly adjusted.
3. Select a long range.
4. Press the [ECHO] key. The following display appears.

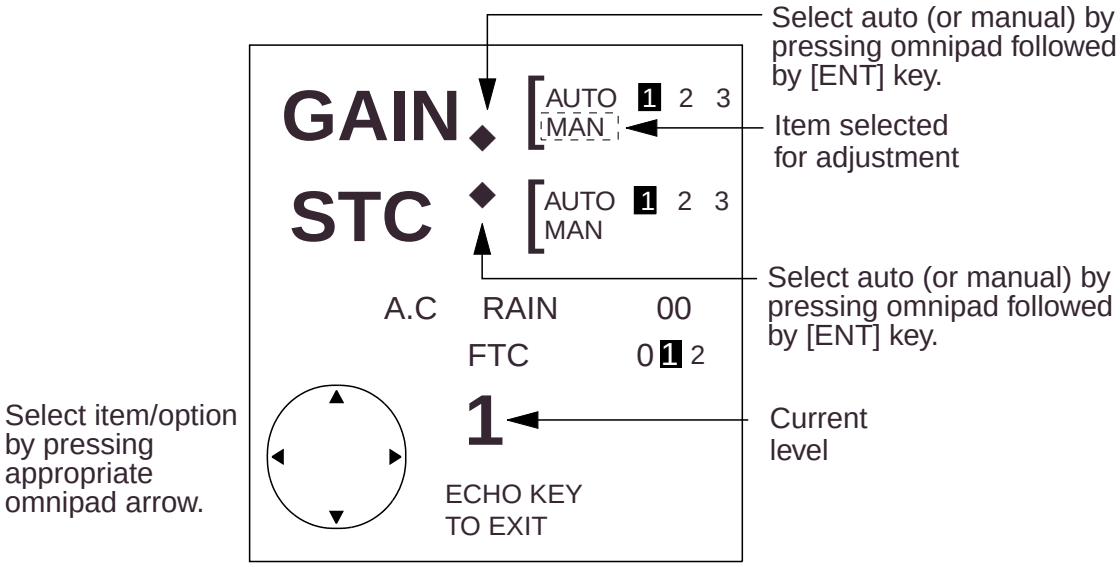


Figure 3-3 Display for adjustment of gain, STC, A/C RAIN and FTC

5. Press the omnipad to select GAIN-AUTO, if it is not already selected.
6. Select minimum range. Press the [ECHO] key and press the omnipad to select STC-AUTO, if it is not already selected.

3.3 Displaying the Installation Menus

Two sets of installation menus, Installation Setup 1 and Installation Setup 2 enable entry of initial settings and adjustment of the radar.

Procedure

1. Turn on the power while pressing and holding down the [HM OFF] key.
2. Press the [MENU] key.

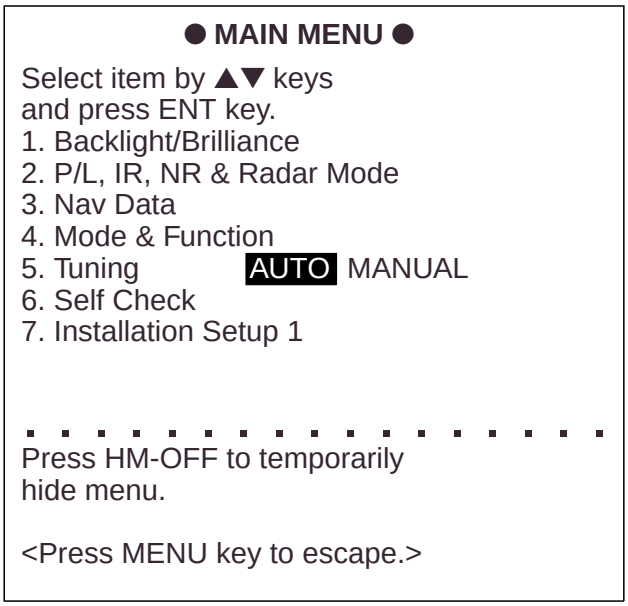


Figure 3-4 main menu

3. Press the omnipad to select Installation Setup 1 and press the [ENT] key.

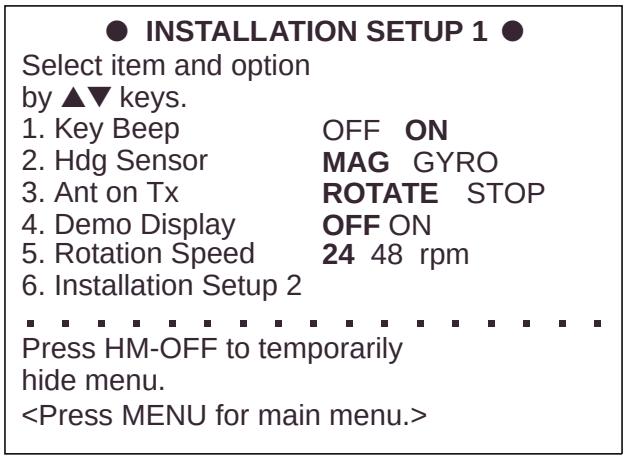


Figure 3-5 Installation setup menu 1

4. To display the Installation Setup 2 menu, press the omnipad to select Installation Setup 2 and press the [ENT] key.

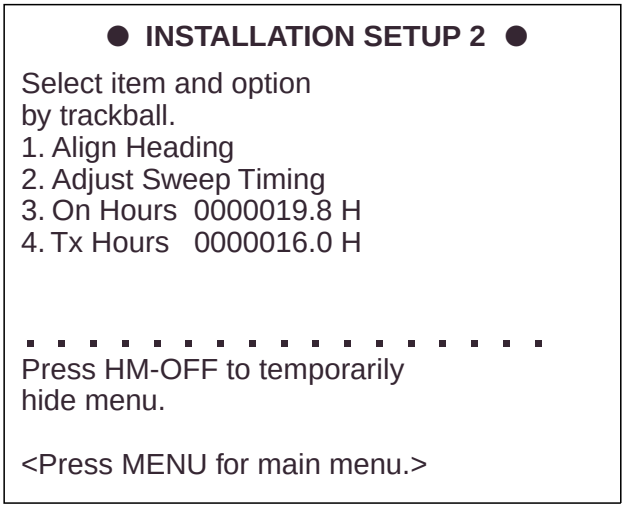


Figure 3-6 Installation setup 2 menu

3.4 Entering Initial Settings

1. At the Installation Setup 1 menu, press the omnipad to select Key Beep. (Key Beep turns on or off the buzzer which sounds when a key is pressed.)
2. Press the omnipad to select OFF or ON.
3. Select Hdg Sensor.
4. Select type of heading sensor connected to the radar; MAGnetic compass or GYROcompass.
5. Press the [ENT] key.

Leave the menu open to complete the next several adjustments.

3.5 Heading Alignment

You have mounted the antenna unit facing straight ahead in the direction of the bow. Therefore, a small but conspicuous target dead ahead visually should appear on the heading mark (zero degrees).

In practice, you will probably observe some small error on the display because of the difficulty in achieving accurate initial positioning of the antenna unit. The following adjustment will compensate for this error, 360 degrees.

1. Identify a suitable target (for example, ship or buoy) at a range between 1/8 to 1/4 miles, preferably near the heading mark. To minimize error, keep echoes in the outer half of the picture by changing the range.
2. Display the Installation Setup 2 menu.

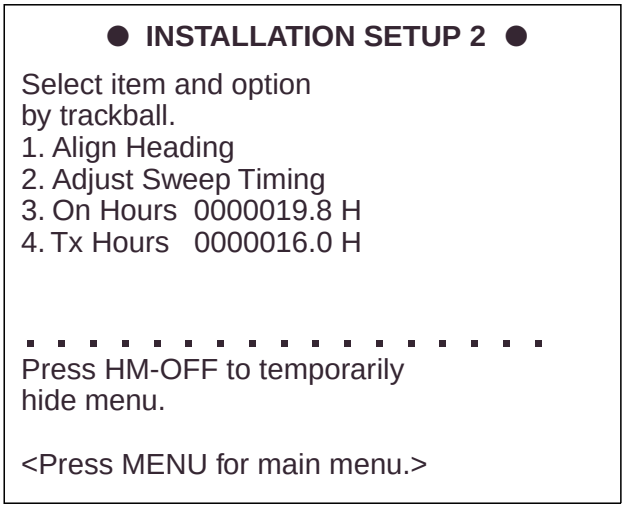


Figure 3-7 Installation setup 2 menu

3. Select Align Heading by pressing omnipad and press the [ENT] key.
4. Press the omnipad to bisect the target selected at step 2 with the EBL.
5. Press the [ENT] key,
6. As a final test, move the boat towards a small buoy and confirm that the buoy shows up dead ahead on the radar when it is visually dead ahead.

3.6 Sweep Timing

This adjustment ensures proper radar performance, especially on short ranges. The radar measures the time required for a transmitted echo to travel to the target and return to the source. The received echo appears on the display based on this time. Thus, at the instant the transmitter is fired, the sweep should start from the center of the display (sometimes called sweep origin.)

A trigger pulse generated in the display unit goes to the antenna unit through the signal cable to trigger the transmitter (magnetron). The time taken by the signal to travel up to the antenna unit varies, depending largely on the length of signal cable. During this period the display unit should wait before starting the sweep. When the display unit is not adjusted correctly, the echoes from a straight local object (for example, a harbor wall or straight pier) will not appear with straight edges — namely, they will be seen as “pushed out” or “pulled in” near the picture center. The range of objects will also be incorrectly shown.

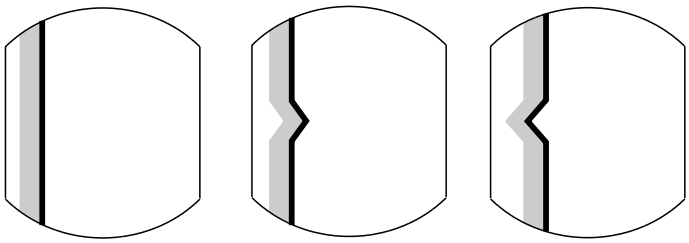
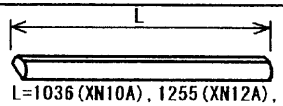
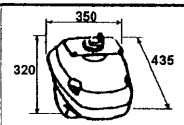
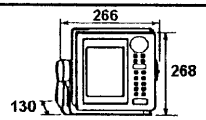
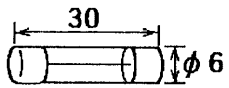
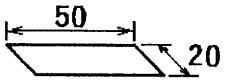
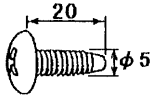
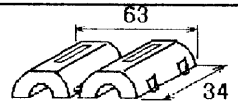
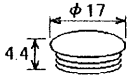
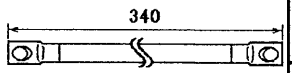
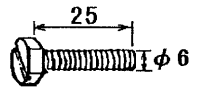
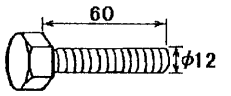
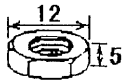
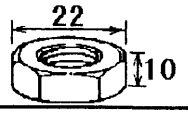
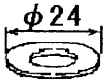
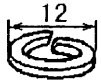


Figure 3-8 Examples of improper and correct sweep timings

1. Display the Installation Setup 2 menu and select Adjust Sweep Timing by pressing omnipad.
2. Transmit the radar on the shortest range.
3. Visually select a straight echo (harbor wall, straight pier).
4. While looking at the target selected above, press omnipad at the 9 o’clock or 3 o’clock position to straighten the target.
5. Press the [ENT] key.
6. After adjustment press the [MENU] key and turn off the power to close the installation menu.

PACKING LIST MODEL851MARK-2

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
ｱﾝﾃﾅ ANTENNA		XN10A 008-219-300	1 (*1)
空中線本体部 ANTENNA UNIT		RSB-0070-065 000-089-841	1 (*1)
指示部 DISPLAY UNIT		RDP-117-5-M2 000-087-746	1
予備品 SPARE PARTS		**SP03-12100**	
ﾋｭｰｽﾞ FUSE		FGBO-A 5A AC125V 000-549-064	2
ﾋｭｰｽﾞ貼りﾏｰｸ FUSE LABEL		03-129-1512-0 100-248-780	1
付属品 ACCESSORIES		**FP03-05900**	
+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ +TAPPING SCREW		5X20 SUS304 1ｼｭ 000-802-081	4
空中線部工材 ANTENNA UNIT INSTALLATION MATERIALS CP03-18401			
EMIｺｱ EMI CORE		RFC-13 000-141-084	3

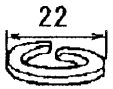
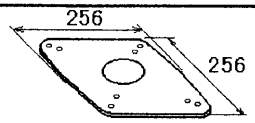
NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ｷｬｯﾌﾟ CAP		040-4010 000-515-332	4
ｱｰｽ線 GROUNDING WIRE		RW-4747-1 03S4747 000-566-000	1
六角ﾎﾞﾙﾄ HEX.BOLT		M6X25 SUS304 000-862-180	1
六角ﾎﾞﾙﾄ（全ﾈｼﾞ） HEX. BOLT		M12X60 SUS304 000-862-191	4
六角ﾅｯﾄ 1種 HEX.NUT		M6 SUS304 000-863-109	1
六角ﾅｯﾄ 1種 HEX.NUT		M12 SUS304 000-863-112	4
ﾐｶﾞｷ平座金 FLAT WASHER		M6 SUS304 000-864-129	3
ﾐｶﾞｷ平座金 FLAT WASHER		M12 SUS304 000-864-132	4
ﾊﾞﾈ座金 SPRING WASHER		M6 SUS304 000-864-260	1

注記) 1.(*1)印の空中線部は、別梱包になります。
ANTENNA UNIT IS PACKED IN SEPARATE BOX.
2.(*2)印の信号ｹｰﾌﾞﾙ組品は、10m,15m,20m,30mの長さがあります。
10,15,20,30m CABLE IS SELECTIVE ON DEMAND.
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

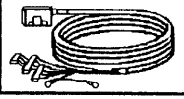
DWG NO.
C3490-Z01- D

A-1

PACKING LIST MODEL851MARK-2

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ﾊﾞﾈ座金 SPRING WASHER		M12 SUS304 000-864-263	4
防蝕ゴム CORROSION-PROOF RUBBER MAT		03-142-3001-0 100-275-580	1
ｼｰﾙﾜｯｼｬ SEAL WASHER		03-001-3002-0 300-130-020	4

その他工材 OTHER INSTALLATION MATERIALS

ｹｰﾌﾞﾙ組品MJ CABLE ASSY.		MJ-A3SPF0016-035 000-138-454	1
信号ｹｰﾌﾞﾙ組品 SIGNAL CABLE ASSY.		S03-83-10 008-492-660**	1 (*2)

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY

注記) 1.(*1)印の空中線部は、別梱包になります。
ANTENNA UNIT IS PACKED IN SEPARATE BOX.
2.(*2)印の信号ｹｰﾌﾞﾙ組品は、10m,15m,20m,30mの長さがあります。
10,15,20,30m CABLE IS SELECTIVE ON DEMAND.
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

A-2

DWG NO.
C3490-Z02- D

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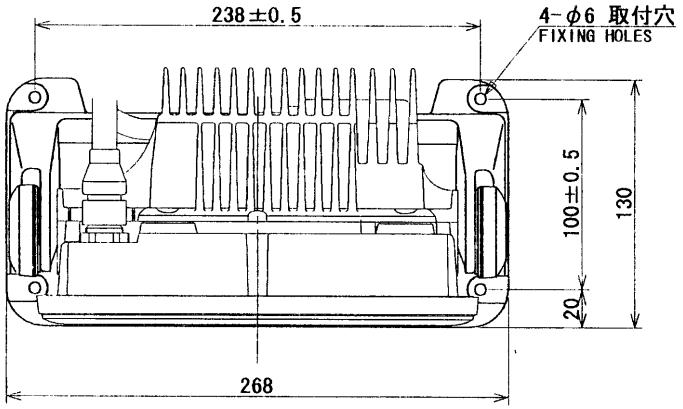


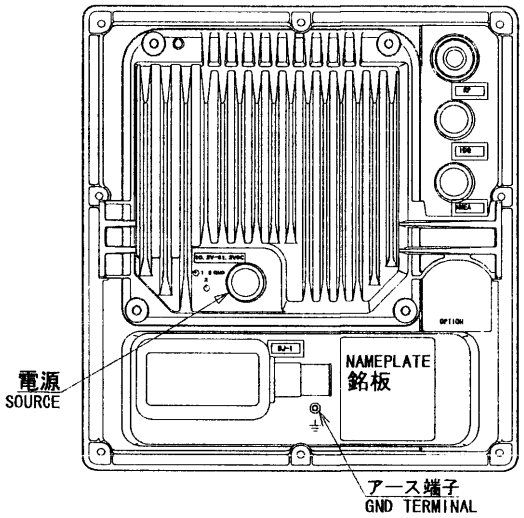
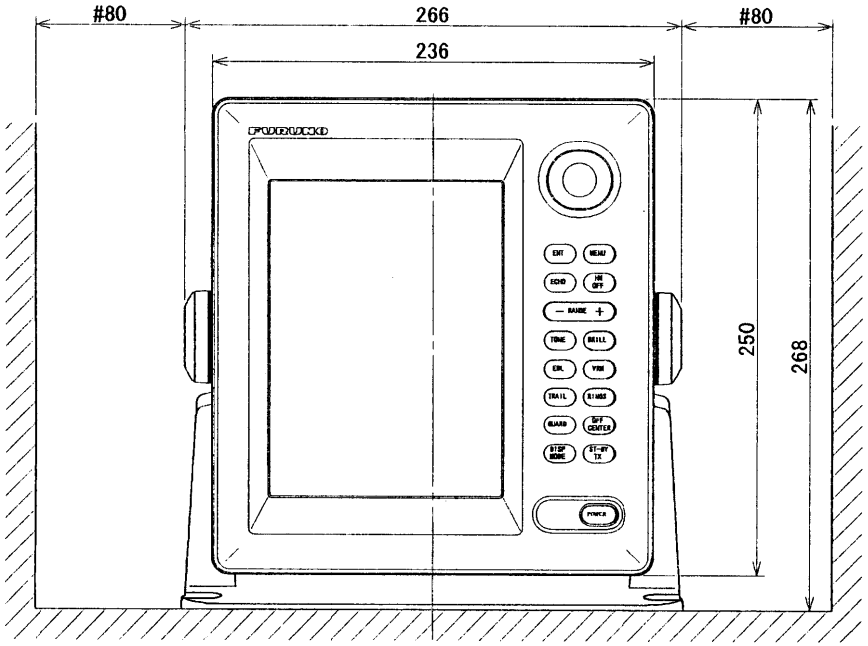


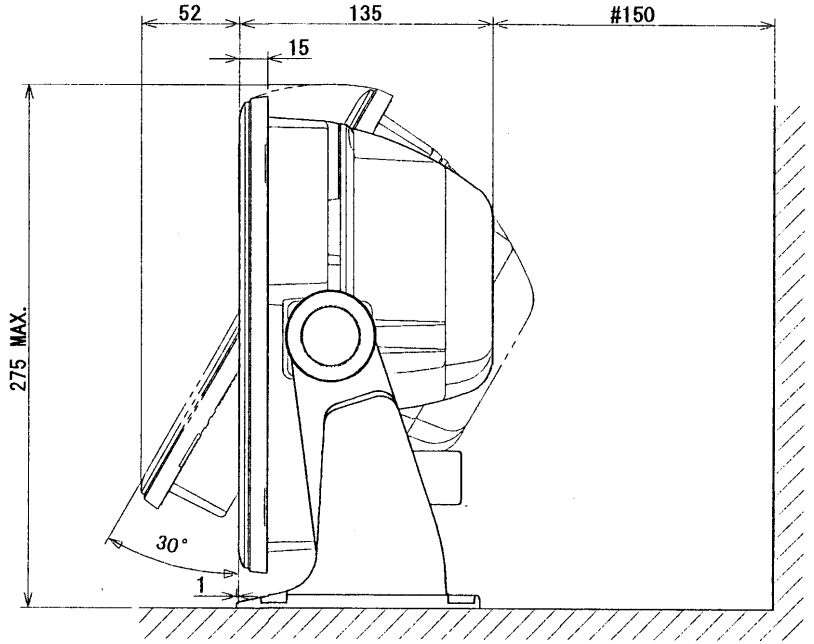
表1 TABLE 1

寸法範囲 (mm) DIMENSION	公差 (mm) TOLERANCE
0 < L ≦ 50	±1.5
50 < L ≦ 100	±2.5
100 < L ≦ 500	±3

表2 TABLE 2

型式 TYPE	質量(kg±10%) MASS
MODEL851 MARK-2	3.5
MODEL851/861	3.3





注 記 1）指定外寸法公差は表1による
2）#：推奨する最小サービス空間寸法。

NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
2. #: RECOMMENDED SERVICE CLEARANCE.

DRAWN	June 22 '01 T.YAMASAKI		TITLE RDP-117
CHECKED	June 22 '01 Y.Ikeda		名称 指示部
APPROVED	June 22 '01 Y.Ikeda	MODEL 851 MARK-2 MODEL 851/861	外寸図
SCALE	1/4	MASS 表2参照 SEE TABLE 2	NAME DISPLAY UNIT
DWG. No.	C3437-G01- C	03-129-1140-G1	OUTLINE DRAWING

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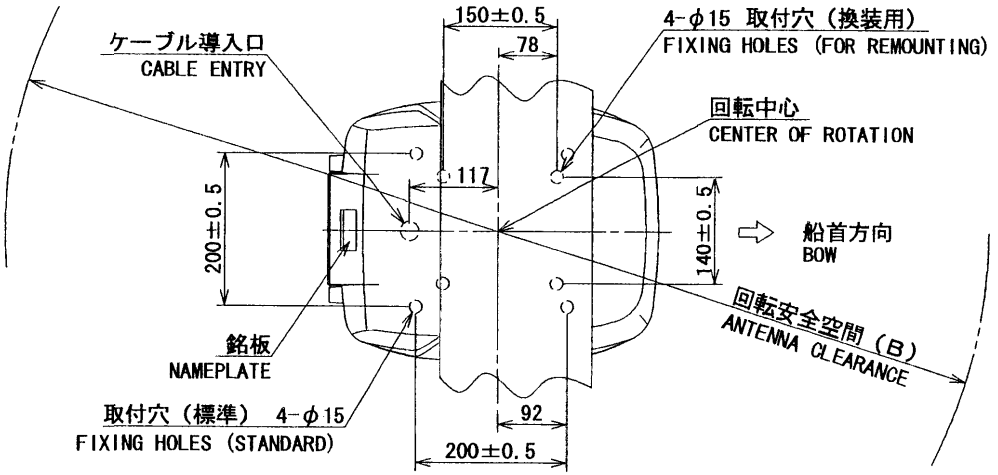


注 記

1） 取付はM12ボルトを使用のこと。
2） 指定外寸法公差は表２による。
3） 本機取付台にφ25-30のケーブル貫通穴を開ける。

NOTE

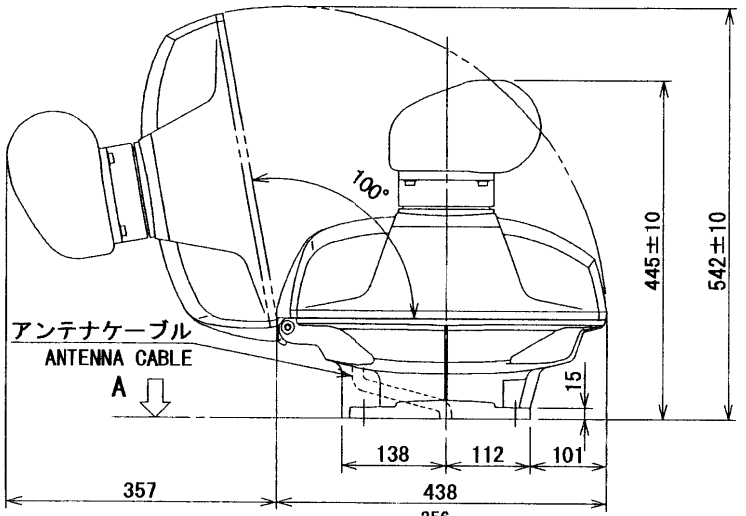
1. USE M12 BOLTS FOR FIXING THE UNIT.
2. TABLE 2 INDICATES TOLERANCE OF DIMENSIONS.
3. MAKE A HOLE φ25-30 ON MOUNTING MAST FOR CABLE PASS.

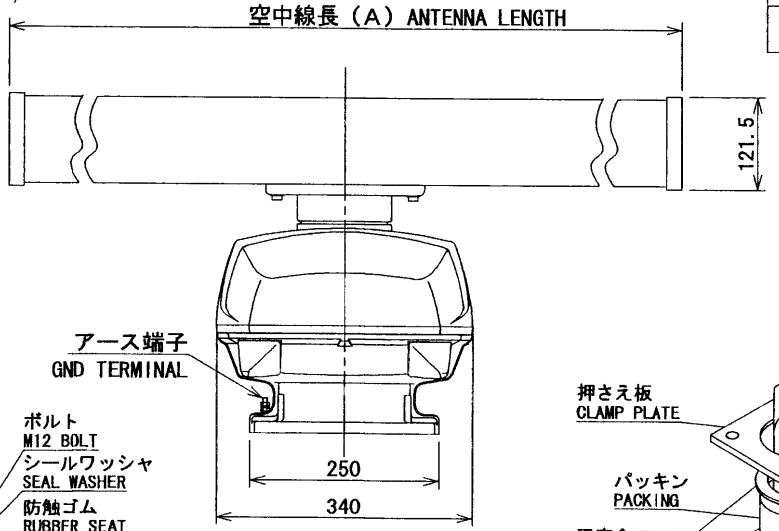
寸法区分（mm） DIMENSION	公差（mm） TOLERANCE
L≦50	±1．5
50<L≦100	±2．5
100<L≦500	±3
500<L≦1000	±4
1000<L≦2000	±5

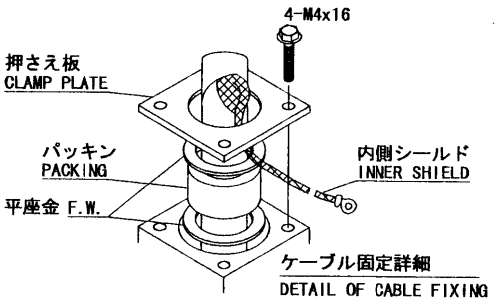
表 2 TABLE 2

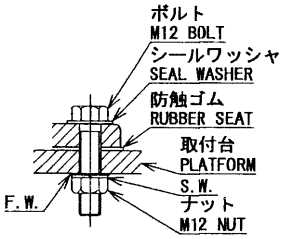
種 類 TYPE	XN10A	XN12A
空中線長(A) LENGTH (mm)	1036±10	1255±10
回転安全空間(B) CLEARANCE (mm)	1200	1400
質 量 (kg) MASS (±10%)	22	23

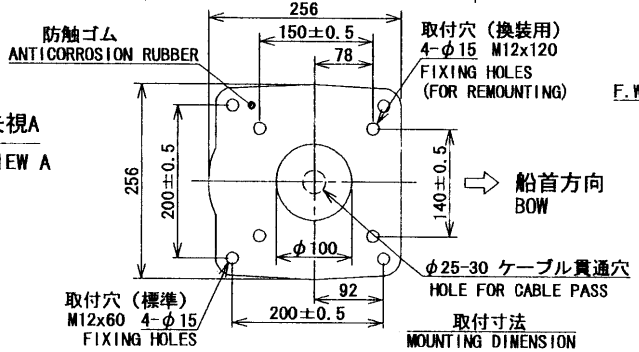
表 1 TABLE 1







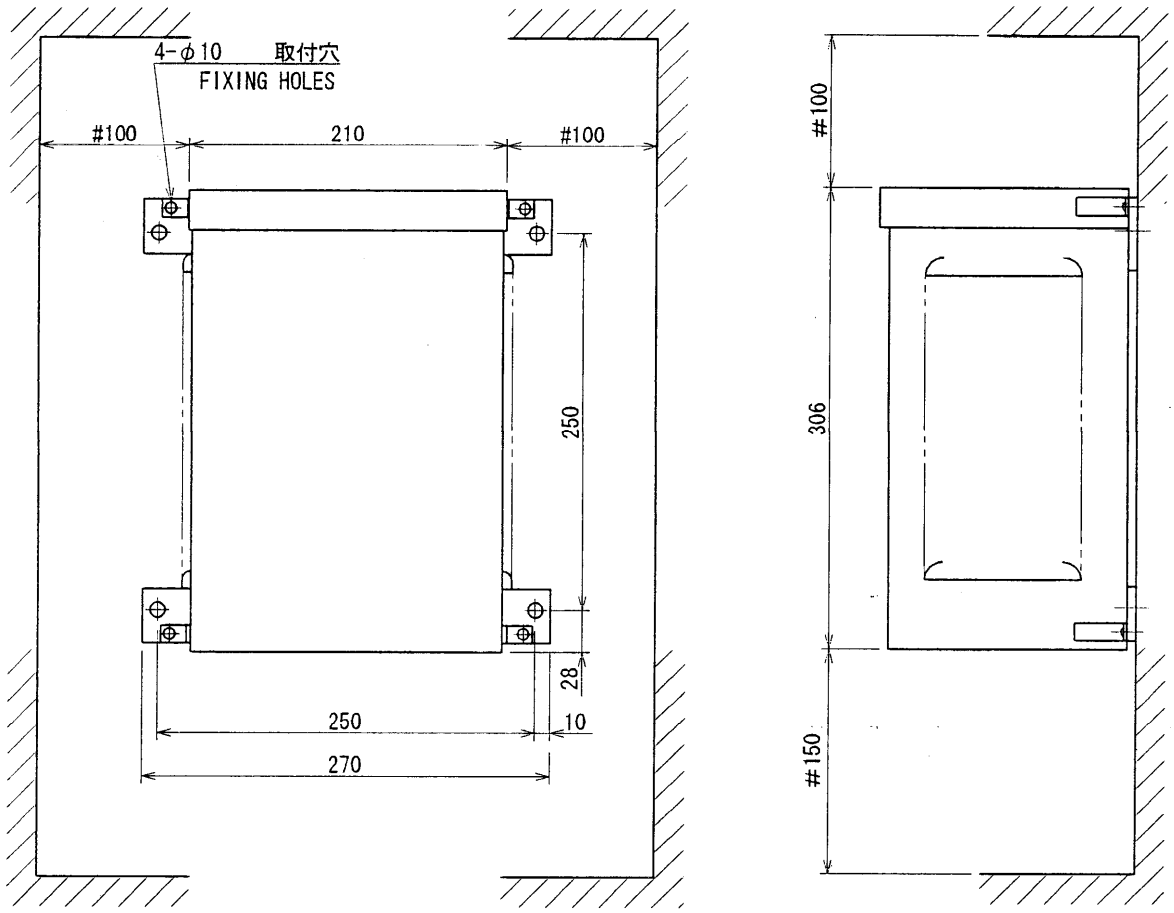




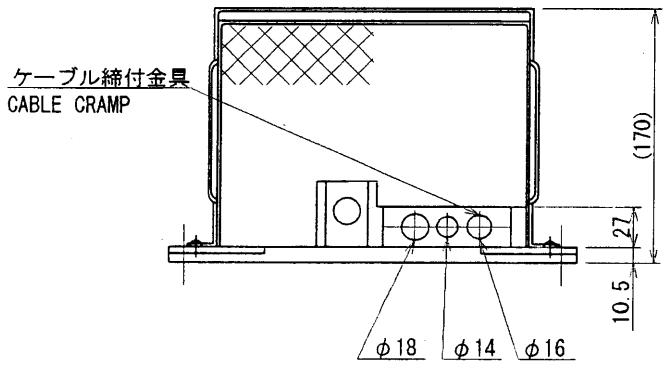
DRAWN Feb. 1 '01 T. YAMASAKI			TITLE RSB-0070/0073
CHECKED Feb 2 '01 K.Kimura			名称 空中線部
APPROVED Feb 5 '01 S.Yoshimura		MODEL 1933 MODEL 1762/C	外寸図
SCALE 1/10	MASS 表２参照 SEE TABLE 2		NAME ANTENNA UNIT
DWG. No. C3500-G01- A		03-153-300G-0	OUTLINE DRAWING

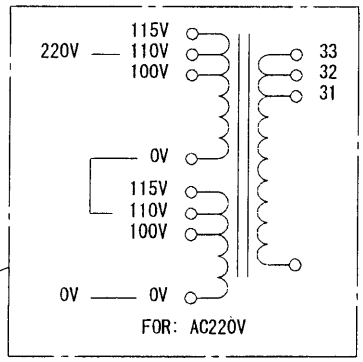
FURUNO ELECTRIC CO., LTD.

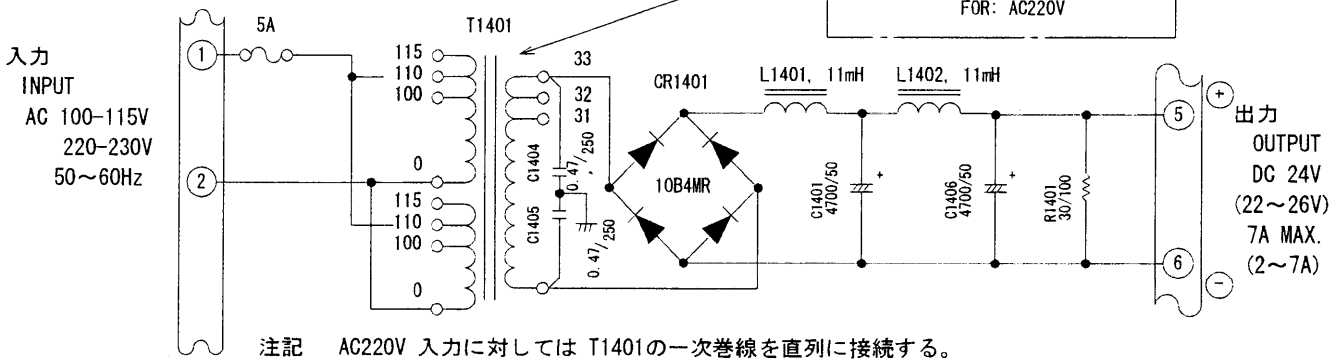
D - 2



NOTE 1. ＃：推奨サービス空間
RECOMMENDED SERVICE CLEARANCE.





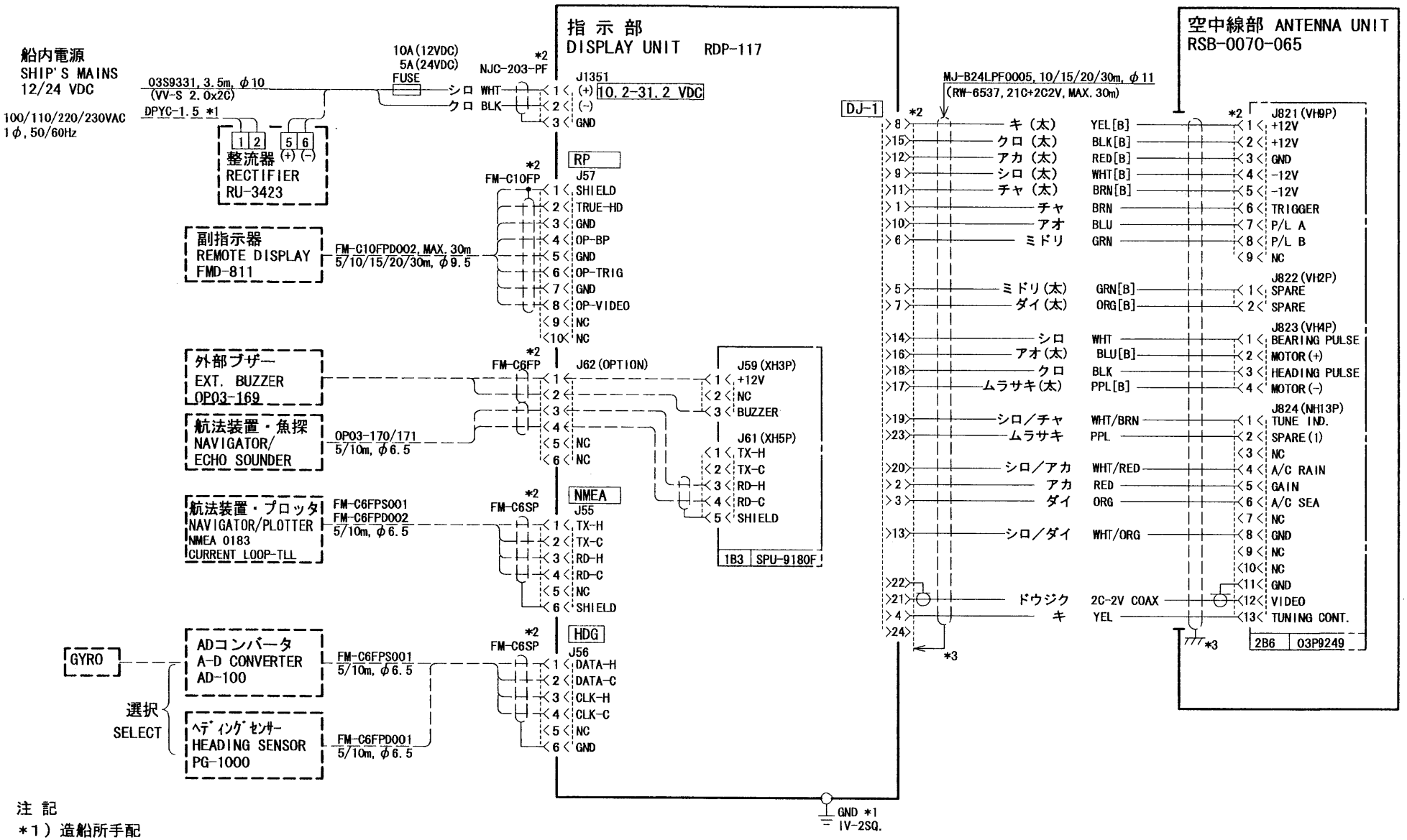


注記 AC220V 入力に対しては T1401の一次巻線を直列に接続する。
NOTE FOR 220V AC INPUT. CONNECT T1401 PRIMARY WINDINGS IN SERIES.

DRAWN Aug 16 '00 T.YAMASAKI		TITLE	RU-3423
CHECKED Aug 17 '00 T.K		名称	整流器
APPROVED Aug 17 '00 T.K			外寸図
SCALE 1/5	MASS ±10% 16.5 kg	NAME	RECTIFIER UNIT
DWG. No. C3002-005- L			OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO



注 記
*1) 造船所手配
*2) コネクタは工場にて取付済み。
*3) シールドは両ユニット側で完全に接地すること。

NOTE
*1. SHIPYARD SUPPLY
*2. CONNECTOR PLUG FITTED AT FACTORY.
*3. SHIELD SHOULD BE EFFECTIVELY GROUNDED AT BOTH UNIT ENDS.

DRAWN May 17 '01 T. YAMASAKI		TYPE	MODEL 851 MARK-2
CHECKED May 18 '01 Y. K		名称	船舶用レーダー
APPROVED May 18 '01 Y. K			相互結線図
SCALE	MASS kg	NAME	MARINE RADAR
DWG. No. C3490-C01- C	03-154-6008- 3		INTERCONNECTION DIAGRAM

S-1

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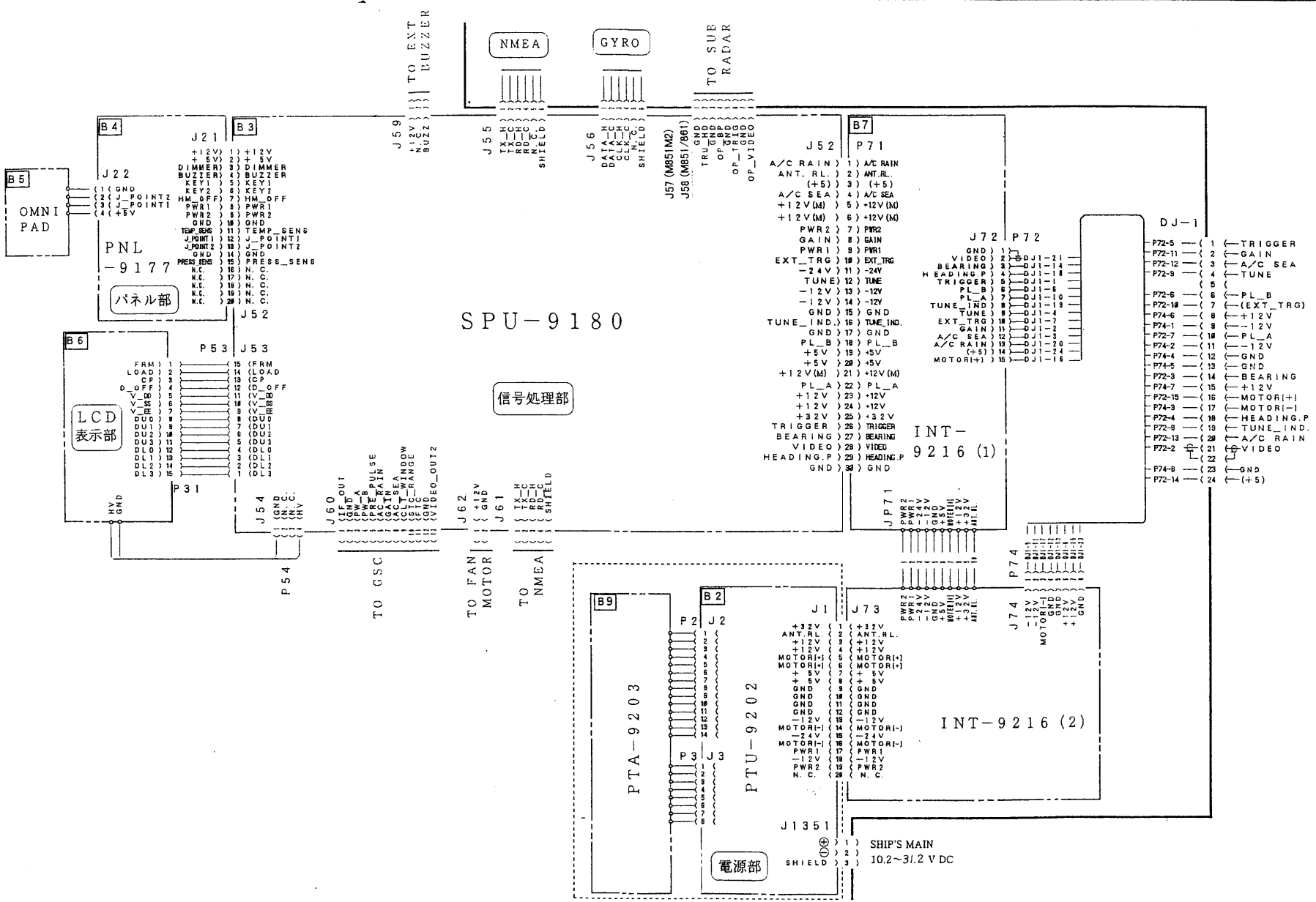
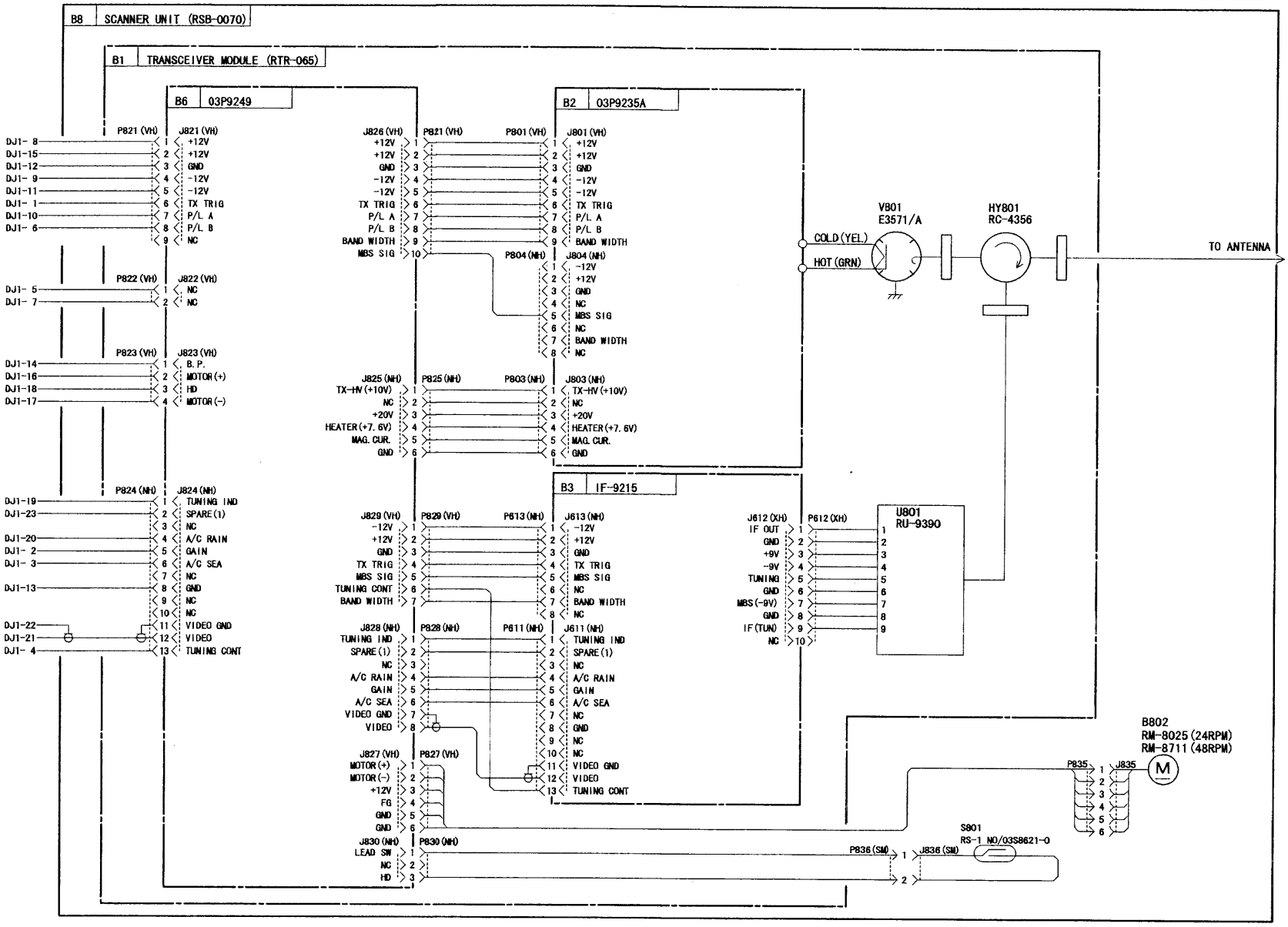


DRAWN Jun 28 '00 T.YAMASAKI			TYPE RDP-117
CHECKED Jun 28 '00 T.Kim	M851M2		名称 指示部（総合）
APPROVED Jun 28 '00 T.Kim	MODEL861 MODEL851		回路図
SCALE / MASS kg	APPLICABLE TO; (MODEL)	BLOCK NO.	NAME DISPLAY UNIT(GENERAL)
DWG NO. C3437-K02- D	03-129-6030- 1		SCHEMATIC DIAGRAM

FURUNO ELECTRIC CO., LTD.

FURUNO



DRAWN May 17 '01 T. YAMASAKI			TITLE	RSB-0070-065
CHECKED May 17 '01 Y.K.	MODEL1762/1762C		名称	空中線部（総合）
APPROVED May 17 '01 Y.K.	MODEL1761 MARK-3 MODEL 851 MARK-2			回路図
SCALE	MASS kg		NAME	SCANNER UNIT (GENERAL)
DWG No. C3481-K01- A				SCHEMATIC DIAGRAM

FURUNO ELECTRIC CO., LTD.

5-13